DB2 Data Management Software

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Porting to 64-bit: IBM DB2 on AMD Opteron™ Processor

Gerry Greenwood
DB2 Linux and Unix Platform Development Manager
IBM Toronto Lab

IBM Software Group

The needs of a database

- Memory is key for databases
 - Optimizing I/O through pre-fetching
 - Reducing I/O through buffering
 - Larger sort areas,…
- Short processor pipelines ./. large cache
 - Fast context switching between application and database
 - “Low cost” management of large data sets
- High speed front side bus
 - Context switching
 - Data movement into processor infrastructure
- Fastest possible processors
 - At the end we can use up all available resources with right customer requirements… always.

Memory – 32bit dilemma

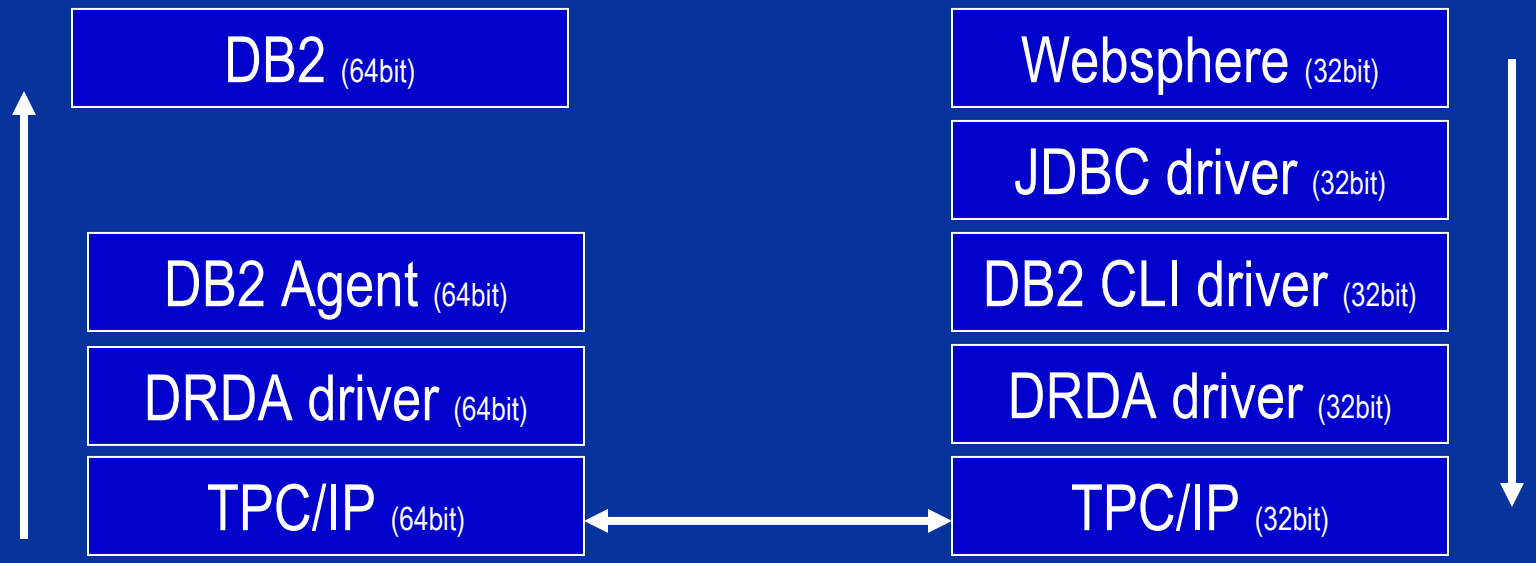
- 32bit systems start to max out the memory needs by now with 4GB RAM for a 2 processor partition
- PXE et al are cost expensive for resources (page mapping and page windowing)
- DB2 Bufferpool is limited to 4 GB theoretical (3.2 GB practical)

Memory – 64bit

- DB2 buffer pool is only limited by purchase price of memory
- Systems support by now up to 512 GB in single server
 - Better deployment of large scale machines (>8processors)
 - New areas of applications in SCM and CRM demand “unlimited memory”
- In memory databases
 - A small SAP system would fit completely in memory
 - Telephone Systems
- Disadvantage: software has to e compiled for 64bit if it should run on the same box as database

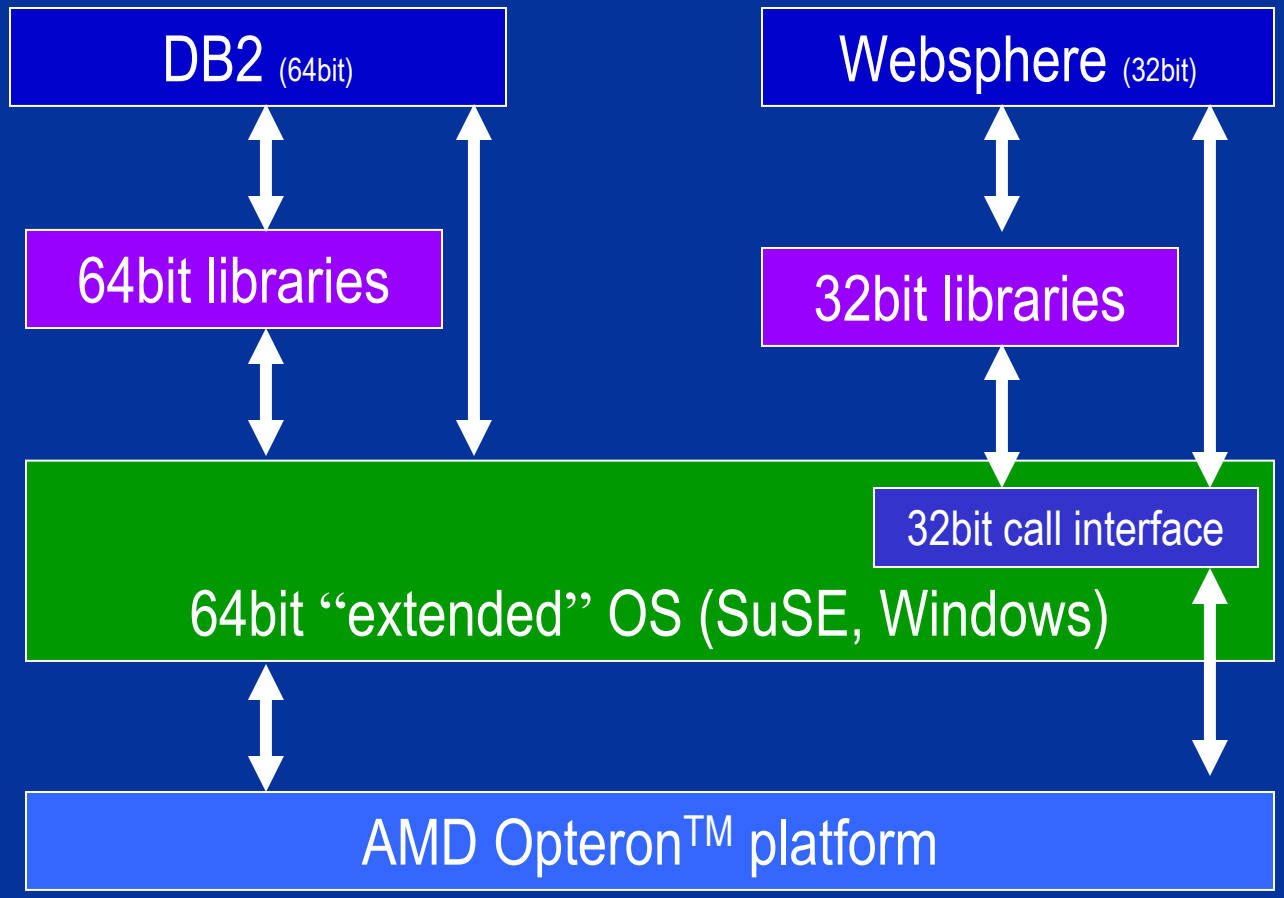
DB2 communication (simplified)

- DB2 DRDA protocol is
 - platform independent
 - bit mode transparent
 - allows 64bit / 32bit communication within one single OS



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The mixed execution



Some facts about the port

- Install with SuSE Linux 32bit
- Upgrade of kernel with 64bit version and adding 64bit libraries
- Install of new version of GCC enabled for the AMD Opteron™ processor
- Adapting the make files for gcc
- Compilation of core DB2
- DB2start

Database Performance Comparison - Mozilla {Build ID: 2002032519-SuSE}

Normal Screen



System Info

Linux Kernel Version:	2.4.19-pre8 (SMP)
CPU model:	AMD ClawHammer(tm)
CPU speed:	796.63 MHz
Processors:	1
physical memory:	508,968 bytes
used memory:	504,620 bytes

Database A

Database Name: tpch1
Database Size: 1,000 MB
Buffer Pool Size: 80 MB

Execution time:	6.92 seconds
Bufferpool Miss Ratio:	75 %
Disk to Bufferpool Read Time :	0.6 seconds

Database B

Database Name: tpch2
Database Size: 1,000 MB
Buffer Pool Size: 4 MB

Execution time:	8.95 seconds
Bufferpool Miss Ratio:	87 %
Disk to Bufferpool Read Time :	0.69 seconds

Select a Query: query2.sql [Benchmark]

Previous Query:

```
select
        s_acctbal,
```

Result:

S_ACCTBAL	S_NAME	N_NAME	P_PARTKEY	P_MFGR	S_ADDRESS	S_PHONE	S_COMMENT
9.967450000000000E+003	Supplier#000002302	FRANCE				29791	Manufacturer#3
9.967450000000000E+003	Supplier#000002302	FRANCE				96032	Manufacturer#4
9.870780000000000E+003	Supplier#000001286	GERMANY				81285	Manufacturer#2
9.560150000000000E+003	Supplier#000001349	RUSSIA				25093	Manufacturer#1

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Possible to dos:

- Exploitation of x86-64 architecture and features
- Optimization for superior performance
- Addition of DB2 features and non-core components
- Hardening of the code through rigorous test cycle

Summary

- 64-bit addressing
- 32 and 64-bit applications running concurrently
- Ease of porting

Resources

- IBM DB2 for Linux
 - ibm.com/db2/linux
- AMD Technology Info
 - www.amd.com/us-en/Processors/DevelopWithAMD/0,,30_2252_875,00.html
- Open source initiatives for x86-64
 - www.x86-64.org

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